REMARKS

This Amendment, submitted in response to the non-final Office Action dated March 24, 2005, is believed to be fully responsive to the points of rejection raised therein. Accordingly, favorable reconsideration on the merits is respectfully requested.

The Examiner has objected to the Specification for several informalities. Each of these objections is addressed in turn.

First, the Examiner indicated that Paragraph 24 is missing. Applicants respectfully submit that Paragraph 24 is not missing and attach hereto a copy of page 6 from the original application as filed November 22, 2002 (Exhibit A). Applicants have viewed the Specification via Public PAIR, and a copy of page 6 as formatted by the USPTO is attached hereto as Exhibit B for the Examiner's convenience. Paragraph 24 appears in Exhibit B, although Applicants do not understand why the large blank appears in Exhibit B between the paragraph number [24] and the text of this paragraph.

Second, the Examiner objected to EXAMPLE in paragraph 34. Applicants note that paragraph 34 was amended in the Amendment dated June 9, 2004 and agree with the Examiner that the Example refers to the Example presented in Paragraph 35. Applicants assume that the Amendment dated June 9, 2004 has been entered in view of the RCE filed July 21, 2004 and the request on page 11 of the Preliminary Amendment dated July 21, 2004. A copy of page 11 of the Amendment dated July 21, 2004 is attached hereto for the Examiner's convenience as Exhibit C.

Third, the Examiner objects to "the means for measuring a change" as stated in Claims 1 and 4. Applicants respectfully note that Claims 1 and 4 were amended in the Amendment dated June 9, 2004. A copy of pages 3 and 4 of the June 9, 2004 Amendment is attached hereto as Exhibit D, for the Examiner's convenience. As amended, Claims 1 and 4 do not recite "the means for measuring a change." Further, film strain sensors are discussed in paragraph 32. By way of example, strain sensors may be used to measure strain, as discussed in Par. 32, and thermocouples may be used to measure temperature. Please note that Paragraph 32 was amended on page 2 of the Amendment dated December 14, 2004.

Last, the Examiner objects to the recitation in certain of the amended claims stating that the thermal strain is positive. To expedite prosecution, Applicants have

amended the Claims to remove this recitation. In view of the above, withdrawal of the objections to the Specification is respectfully requested.

Claims 1, 3, 4, 10, 11, 17-26, 28 and 29 are pending. Claims 2, 5-9, 12-16 and 27 are cancelled above. Claims 1, 10, 17, 25 and 26 are amended above. No new matter is added by the amendments.

Claims 1, 5, 17 and 25-26 stand rejected under 35 USC 112, first paragraph. Claims 5, 8-11, 13-16 and 25-27 stand rejected under 35 USC 103(a) over Budhani et al. Claims 6 and 7 stand rejected under 35 USC 103(a) over Budhani, in view of EP 0908713A1. Claims 28 and 29 stand rejected under 35 USC 103(a) over Budhani, in view of US Patent No. 6,568,848 (Chapman). Claim 12 stands rejected under 35 USC 103(a) over Budhani, in view of US Patent No. 5,411,600 (Rimai). The Examiner indicated that Claims 1, 3, 4 and 17-24 would be allowable if rewritten or amended to overcome the rejections under 35 USC 112. Applicants respectfully submit the following remarks in support of the patentability of the claims.

1. **Claims 1, 5, 17 and 25-26:**

Claims 1, 5, 17 and 25-26 stand rejected under 35 USC 112, first paragraph. In particular, the Examiner objects to the term "positive." The claims have been amended to remove this recitation. Accordingly, withdrawal of the rejection of Claims 1, 5, 17 and 25-26 under 35 USC 112, first paragraph is respectfully requested.

2. **Claims 1, 3 and 4:**

The Examiner indicated that Claims 1, 3 and 4 would be allowable if rewritten to overcome the rejections under 35 USC 112. Claim 1 has been amended accordingly. Claims 3 and 4 depend from Claim 1. Accordingly, Applicants respectfully submit that Claims 1, 3 and 4 are in condition for allowance.

3. **Claims 10 and 11:**

Claim 10 has been amended to include an additional recitation discussed by the Examiner on page 7 of the Office Action in the section entitled "Allowable Subject Matter." Claim 11 depends from Claim 10. Accordingly, Applicants respectfully request that the rejections of Claims 10 and 11 under 35 USC 103(a) be withdrawn.

4. Claims 17-24:

The Examiner indicated that Claims 17-24 would be allowable if rewritten to overcome the rejections under 35 USC 112. Claim 17 has been amended accordingly. Claims 18-24 depend from Claim 17. Accordingly, Applicants respectfully submit that Claims 17-24 are in condition for allowance.

5. Claims 25, 26, 28 and 29:

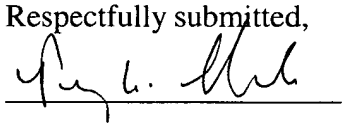
Claim 25 has been amended to include an additional recitation discussed by the Examiner on page 7 of the Office Action in the section entitled "Allowable Subject Matter." Claims 26, 28 and 29 depend from Claim 25. Accordingly, Applicants respectfully request that the rejections of Claims 25, 26, 28 and 29 under 35 USC 103(a) be withdrawn.

In view of the foregoing, Applicants respectfully submit that the application is in condition for allowance. Favorable reconsideration and prompt allowance of the application are respectfully requested.

Please charge all applicable fees associated with the submittal of this Amendment and any other fees applicable to this application to the Assignee's Deposit Account No. 07-0868.

Should the Examiner believe that anything further is needed to place the application in even better condition for allowance, the Examiner is requested to contact Applicants' undersigned representative at the telephone number below.

Respectfully submitted,



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June 22, 2005
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[0022] Figures 1 and 2 show the perspective and the cross-sectional view of the first embodiment of the invention. It should be understood that the figures are not drawn to scale. A base film 10 of a dielectric material is disposed on a portion of substrate 20. Wherever a dielectric material is mentioned herein, it can be substituted by an electrically insulating material. Preferably, base film 10 is disposed on a surface of substrate 20 without removing any material of substrate 20 to compensate for the thickness of base film 10 and any films disposed thereon. Thus, the mechanical strength of the substrate is substantially preserved. For example, no cuts or grooves are made in substrate 20 in order to embed the dielectric material and any other materials subsequently deposited thereon. The dielectric material has a thermal expansion coefficient that is compatible with that of the substrate over a wide range of operating temperature of the substrate. When the thermal expansion coefficient varies over this operating temperature range, the compatibility of thermal expansion coefficients is typically determined at about the highest operating temperature. Thermocouple films 30 and 40 of materials suitable for making a thermocouple are deposited on base film 10 to join at thermocouple junction 50. A protective dielectric film 60 is deposited on base film 10 and thermocouple films 30 and 40 to completely enclose films 30 and 40 between dielectric films 10 and 60. Thermocouple leads (not shown) are attached to thermocouple films 30 and 40 to provide a measurement of the temperature at junction 50.

[0023] Alternatively, the thermocouple can comprise a thermocouple film deposited on the base dielectric film and extending beyond an edge of the base dielectric film to form a thermocouple junction with the substrate when such substrate comprises an electrically conducting material.

[0024] In one embodiment of the present invention, substrate 20 is a turbine engine component and is made of a nickel-, nickel-iron-, or cobalt-based superalloy. Dielectric materials of base film 10 and protective film 60 can be the same or different materials and are selected from the group consisting of AlN, BN, MgO, TiO_2, ZrO_2, La_2O_3, Cr_2O_3, ThO_2, BeO, a mixture of NiO and Al_2O_3, and mixtures thereof. Thermal expansion coefficients of these materials at 1000^0 C are shown in Table 1.

[t1]

Thermocouple films 30 and 40 of materials suitable for making a thermocouple are deposited on base film 10 to join at thermocouple junction 50. A protective dielectric film 60 is deposited on base film 10 and thermocouple films 30 and 40 to completely enclose films 30 and 40 between dielectric films 10 and 60. Thermocouple leads (not shown) are attached to thermocouple films 30 and 40 to provide a measurement of the temperature at junction 50.

[0023] Alternatively, the thermocouple can comprise a thermocouple film deposited on the base dielectric film and extending beyond an edge of the base dielectric film to form a thermocouple junction with the substrate when such substrate comprises an electrically conducting material.

[0024]

In one embodiment of the present invention, substrate 20 is a turbine engine component and is made of a nickel-, nickel-iron-, or cobalt-based superalloy. Dielectric materials of base film 10 and protective film 60 can be the same or different materials and are selected from the group consisting of AlN, BN, MgO, TiO_2, ZrO_2, La_2O_3, Cr_2O_3, ThO_2, BeO, a mixture of NiO and Al_2O_3, and mixtures thereof. Thermal expansion coefficients of these materials at 1000^0 C are shown in Table 1.
[t1]

The Applicants hereby respectfully request that the Applicants' amendments and remarks dated June 9, 2004 be entered. In addition, the Applicants respectfully request that the current amendments and remarks also be considered.

Japanese Reference JP 410034825A Does Not Teach The Same Thermal Strain Recited in Claims 1, 3, 5-11, and 13-29

The Advisory Action states that the Applicants' "argument [that JP'825 teaches a different concept of strain] is not persuasive because the Examiner only uses JP, as a secondary reference, for its teaching that the thermal strain of 0.006 can be provided between two material if desired." The Applicants respectfully traverse this statement because (1) JP '825 does not teach a thermal strain that is positive but less than about 0.006, as recited in amended claims 1, 5, 10, 17, 25, 26, and all claims dependent therefrom; and (2) even if a reference is used as a secondary reference under a Section 103(a) rejection, the combination of that reference with the primary reference still must teach or suggest all of the limitations of each of the claims. Therefore, if the secondary reference is used as evidence of the alleged teaching of an element of the claim, the meaning of that element must be the same as that in the claim. Otherwise, the reference does not teach or suggest the same element.

JP '825 teaches a truss structure that has zero strain because the two layers bonded to either side of the truss have opposite expansion coefficients: one positive and one negative. *See; e.g.,* "Method for solution' on page 4 of the enclosed English translation of JP '825; paragraph 0003 on page 7; paragraph 0008 on page 9; and paragraph 0011 on page 10. Thus, JP '825 teaches that a layer having positive thermal expansion is attached to one side of a structure and a layer having negative thermal expansion is attached to the other side of the structure. The opposite expansion of these layers keeps the net strain of the whole unit at zero strain.

In contradistinction, the instant claims do not recite three layers, the two outer layers of which have opposite coefficients of expansions.

Since the concept of strain taught in JP '825 is different from that recited in each of claims 1, 3, 5-11, and 13-29, combinations of JP '825 and one or more other cited references do not teach or suggest all of the limitations of each of these claims. Thus, these claims are patentable over any combination of references that includes JP '825.

The listing of claims will replace all prior versions, and listings, of claims in the application:

LISTING OF CLAIMS

Claim 1 (currently amended): A system for measuring a condition of a turbine engine component, said condition being selected from the group consisting of strain and combination of temperature and strain of said component, said system comprising:

a first electrically non-conducting film comprising a material selected from the group consisting of dielectric materials and electrically insulating materials, said first film being disposed on a substrate of said turbine engine component without a removal of a substrate material to compensate for a thickness of said first electrically non-conducting film; and

at least a film of an electrically conducting material disposed on said first electrically non-conducting film wherein ~~; and~~

~~means for measuring~~ a change in a property of said at least a film of said electrically conducting material is measured, said change in said property relating to said condition of said turbine engine component, said property being electrical resistance of said film of said electrically conducting material when said condition is strain, and said property being electromotive force developed in said film of said electrically conducting material when said condition includes temperature;

wherein said first electrically non-conducting film comprises a material that has a thermal expansion coefficient selected such that said electrically non-conducting film and said at least a film of said electrically conducting material remain adhered to films and substrates adjacent thereto through at least a cycle of extreme operating temperature, and wherein a thermal strain between said first electrically non-conducting film and said substrate is maintained at less than about 0.006.

Claim 2 (canceled)

Claim 3 (original): The system according to claim 1 further comprising a second electrically non-conducting film disposed on said first electrically non-conducting film and said at least a

film of an electrically conducting material, wherein said second electrically non-conducting film comprises a material that has a thermal expansion coefficient selected such that said electrically non-conducting films and said at least a film of said electrically conducting material remain adhered to films adjacent thereto through at least a cycle of extreme operating temperature.

Claim 4 (currently amended): A system for measuring a condition of a turbine engine component, said condition being selected from the group consisting of strain and combination of strain and temperature, said system comprising:

a first electrically non-conducting film comprising a material selected from the group consisting of dielectric materials and electrically insulating materials, said first film being disposed on a substrate of said turbine engine component without a removal of a substrate material to compensate for a thickness of said first electrically non-conducting film; and

at least a film of an electrically conducting material disposed on said first electrically non-conducting film wherein; ~~and~~

~~means for measuring~~ a change in a property of said at least a film of said electrically conducting material is measured, said change in said property relating to said condition of said turbine engine component, said property being electrical resistance of said film of said electrically conducting material when said condition is strain, and said property being electromotive force developed in said film of said electrically conducting material when said condition includes temperature;

wherein said at least a film of an electrically conducting material extends beyond an edge of said first electrically non-conducting film to form a thermocouple junction with said substrate.

Claim 5 (currently amended): A system for measuring a temperature of a turbine engine component, said system comprising:

a first electrically non-conducting film comprising a material selected from the group consisting of dielectric materials and electrically insulating materials, said first electrically non-conducting film being disposed on a substrate of said turbine engine component